A.CED.A.4: Transforming Formulas 1b

1 Boyle's Law involves the pressure and volume of gas in a container. It can be represented by the formula $P_1V_1 = P_2V_2$. When the formula is solved for P_2, the result is

2 Michael borrows money from his uncle, who is charging him simple interest using the formula $I = \Pr t$. To figure out what the interest rate, *r*, is, Michael rearranges the formula to find *r*. His new formula is *r* equals

3 The equation for the volume of a cylinder is $V = \pi r^2 h$. The positive value of *r*, in terms of *h* and *V*, is

4 The formula for the volume of a cone is $V = \frac{1}{3}\pi r^2 h$. The radius, *r*, of the cone may be expressed as

5 The distance a free falling object has traveled can be modeled by the equation $d = \frac{1}{2}at^2$, where *a* is acceleration due to gravity and *t* is the amount of time the object has fallen. What is *t* in terms of *a* and *d*?

6 The formula for blood flow rate is given by $F = \frac{p_1 - p_2}{r}$, where *F* is the flow rate, p_1 the initial pressure, p_2 the final pressure, and *r* the resistance created by blood vessel size. Which formula can *not* be derived from the given formula?

1) $p_1 = Fr + p_2$
2) $p_2 = p_1 - Fr$
3) $r = F(p_2 - p_1)$
4) $r = \frac{p_1 - p_2}{F}$

7 The formula for the sum of the degree measures of the interior angles of a polygon is $S = 180(n - 2)$. Solve for *n*, the number of sides of the polygon, in terms of *S*.

8 Solve the equation below for *x* in terms of *a*.

$$4(ax + 3) - 3ax = 25 + 3a$$

9 The formula for the area of a trapezoid is $A = \frac{1}{2}h(b_1 + b_2)$. Express b_1 in terms of *A*, *h*, and b_2. The area of a trapezoid is 60 square feet, its height is 6 ft, and one base is 12 ft. Find the number of feet in the other base.

10 The formula $F_g = \frac{GM_1M_2}{r^2}$ calculates the gravitational force between two objects where *G* is the gravitational constant, M_1 is the mass of one object, M_2 is the mass of the other object, and *r* is the distance between them. Solve for the positive value of *r* in terms of F_g, *G*, M_1, and M_2.

11 The volume of a large can of tuna fish can be calculated using the formula $V = \pi r^2 h$. Write an equation to find the radius, *r*, in terms of *V* and *h*. Determine the diameter, to the *nearest inch*, of a large can of tuna fish that has a volume of 66 cubic inches and a height of 3.3 inches.

12 Using the formula for the volume of a cone, express *r* in terms of *V*, *h*, and π.

A.CED.A.4: Transforming Formulas 1b
Answer Section

1 ANS:
$$\frac{P_1 V_1}{V_2}$$

REF: 011704ai

2 ANS:
$$\frac{I}{Pt}$$

REF: 011606ai

3 ANS:
$$r = \sqrt{\frac{V}{\pi h}}$$

REF: 011516ai

4 ANS:
$$\sqrt{\frac{3V}{\pi h}}$$

$$V = \frac{1}{3}\pi r^2 h$$

$$3V = \pi r^2 h$$

$$\frac{3V}{\pi h} = r^2$$

$$\sqrt{\frac{3V}{\pi h}} = r$$

REF: 061423ai

5 ANS:
$$t = \sqrt{\frac{2d}{a}}$$

$$d = \frac{1}{2}at^2$$

$$2d = at^2$$

$$\frac{2d}{a} = t^2$$

$$\sqrt{\frac{2d}{a}} = t$$

REF: 061519ai

6 ANS: 3 REF: 061723ai

7 ANS:

$$\frac{S}{180} = n - 2$$

$$\frac{S}{180} + 2 = n$$

REF: 061631ai

8 ANS:

$$4ax + 12 - 3ax = 25 + 3a$$

$$ax = 13 + 3a$$

$$x = \frac{13 + 3a}{a}$$

REF: 081632ai

9 ANS:

$$A = \frac{1}{2}h(b_1 + b_2) \quad b_1 = \frac{2(60)}{6} - 12 = 20 - 12 = 8$$

$$\frac{2A}{h} = b_1 + b_2$$

$$\frac{2A}{h} - b_2 = b_1$$

REF: 081434ai

10 ANS:

$$F_g = \frac{GM_1M_2}{r^2}$$

$$r^2 = \frac{GM_1M_2}{F_g}$$

$$r = \sqrt{\frac{GM_1M_2}{F_g}}$$

REF: 011830ai

11 ANS:

$\frac{V}{\pi h} = \frac{\pi r^2 h}{\pi h}$ $d = 2\sqrt{\frac{66}{3.3\pi}} \approx 5$

$\frac{V}{\pi h} = r^2$

$\sqrt{\frac{V}{\pi h}} = r$

REF: 081535ai

12 ANS:

$V = \frac{1}{3}\pi r^2 h$

$3V = \pi r^2 h$

$\frac{3V}{\pi h} = r^2$

$\sqrt{\frac{3V}{\pi h}} = r$

REF: 081727ai